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ABSTRACT

U.S. industry and the U.S workplace are changing. More highly skilled jobs are replacing unskilled and semiskilled jobs, and more jobs require higher-order thinking skills. At the same time, the education system is failing to educate young people to fill those jobs in the future. Although a higher percentage of students graduate than ever before, the skills many of these students learn in school do not prepare them for higher-level thinking and problem solving. Added to the problem is that more students today, and increasingly in the future, come from single-parent homes, from minority groups, and from poverty-level settings. Vocational education could be helpful for some of these students, because vocational programs teach problem-solving and analytical skills and reinforce basic communication and interpersonal skills. Public education has historically responded to the needs of a changing U.S. economy and society. Tomorrow, the challenge will be very different. The very nature of work and the workplace will require a new set of skills and the schools must prepare all students to be successful in the new work environment. The new worker is really two people: (1) a worker with the knowledge, skills, and attitudes to function as a member of a team with ever-changing technology in a flexible production environment; and (2) a student who functions in a flexible learning environment. The nation's corporations are learning this; the nation's schools must learn it too. (48 references) (KC)

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THE NEW AMERICAN WORKER

by

PAUL F. COLE

A discussion paper prepared for a conference presented by the New York State Senate on "Policy Options and Strategies for Labor Shortages."

Buffalo, New York
September 11, 1989

The United States is in the midst of a great national debate over the future of its economic role in the world and how America's education system should respond. The fortunes of both are intertwined and the solution to each is the same – restructuring. The very changes that are taking place in America's most progressive corporations must be mirrored in her schools if the United States is to remain a world leader. The economic restructuring requires an educational restructuring.

America is experiencing a transformation not witnessed since the Industrial Revolution.

An increasingly competitive global economy is challenging America's economic preeminence.

Fundamental changes are rapidly taking place in the nature of work and of the workplace requiring new and different skills.

Demographic trends and societal changes are transforming America and presenting new concerns about the workforce of tomorrow.

Our ability to respond will have a major impact on the economic, social and political future of our nation.

A CHANGING ECONOMY

Following World War II, the American economy emerged as the undisputed leader in the world. The United States enjoyed a huge domestic market. It was the world leader in technology. It possessed a workforce more skilled than most other countries. It was far wealthier than other nations and had the best managers in the world.

Since the war, America's economic primacy has waned as other nations rebuilt their industries, made improvements in technology, upgraded their education systems and adopted new and innovative management practices. For example, while American management continued its traditional strategies, the Japanese adopted the management system of W. Edwards Deming that is widely credited with improving the quality and productivity of Japanese industry.

Demings, an American, told U. S. businessmen following World War II that unless they changed their approach to productivity and quality, our economy would suffer.

Fundamental to Deming's approach was his belief that workers were not simply flesh and blood robots, but thinking, creative human beings who could make major contributions to improving production quality and efficency.

Using Deming's strategy, the Japanese began to outperform American industry and gain increasing market share in auto, electronics and other fields. American management was quick to blame taxes, regulations, unions, societal problems or anything other than how their corporations were run.

The American production system was based upon principles developed by Frederick W. Taylor called "scientific management." It is characterized by the division of production work into simple, repetitive tasks performed by unskilled workers under strict control of supervisors. The system is highly authoritarian.

In addition, many place the blame for American corporate failure squarely on U. S. management's preoccupation with their personal welfare and on short-term profits, while ignoring more long-run investments in technology and workers. Robert Hayes and William Abernathy in the *Harvard Business Review* charged the economic decline to "the failure of American managers to keep their companies technologically competitive over the long run." They argued that the failures were in large part due to a concentration on short-term marketing and financial concerns and a neglect of production improvements (Hayes and Abernathy, 1980).

This philosophy was a major contributor to the decline of America's economic leadership. The United States has gone from the world's largest creditor nation to its largest debtor nation in less than a decade. We are experiencing the largest budget and trade deficits in our history.

The impact on America's workers and families has been devastating. Hundreds of thousands of manufacturing jobs have been lost, entire industries have been gutted and opportunities to build new industries in such fields as electronics have been squandered.

Since the early 1970s, real wages and incomes have stagnated and declined as a result of a weakening U. S. economy. In take-home pay, U. S. workers in 1986 were 14 percent worse off in real terms as they were in 1973. The real earnings are lower today than in 1961. American families are working more hours yet earned 11 percent less in 1984 than they did in 1967 taking inflation into account (*Crossroads for America*, 1987).

Much of America's economic strength was based on mass production techniques that made it possible to employ workers with modest skills to turn out low-cost, high quality products in large volume. The benefits were good profits, good wages and an ever expanding market. Using machinery and the assembly line, most jobs could be done by unskilled or semi-skilled workers with skilled craft workers performing some functions.

Today, however, that machinery is available virtually anywhere in the world where workers are willing to work longer hours at lower pay than American workers.

America can no longer compete at prevailing world wage levels for low-skilled or semi-skilled labor without suffering a massive decline in its standard of living.

Today, high industrial wages require highly skilled workers interacting with the latest technology. In today's world, it is easy to move machinery, capital and technology, but it is difficult to sustain a large and well educated workforce.

According to Thomas Bailey, the successful corporations of tomorrow will be those able to respond to ever changing markets for goods and services. Consumers are increasingly demanding more variety, style, quality and service. As a result, firms are attempting to increase their variety and reduce the time it takes to make their products or services available. To accomplish this, they are not only taking advantage of new technology but restructuring their production process to one where "the relationships among individuals within firms, among the departments and divisions of firms, and among firms in the overall supply chain are more integrated, interactive, immediate and complex" (Bailey, 1989). These trends are already occuring in the more progressive corporations in textile and other industries.

THE CHANGING NATURE OF WORK

Current efforts by American corporations to restructure are having a far reaching impact on the nature of work and the workplace.

Bailey argues that the changes have resulted in occupational upgrading and not "deskilling." The very lowest level jobs are being eliminated and middle level jobs are becoming more demanding. Increasing intellectual and skill demands are being placed on lower and middle level workers. These personnel will require greater specific technical skills as well as the know-how to manage and operate in interactive environments.

Bailey points out that workers will need a greater ability to work in an environment that is more uncertain and non-routine.

Sue E. Berryman of the National Center on Education and Employment at Columbia University also describes dramatic changes in the nature of work. Citing the work of Bailey and Thierry Noyelle, she notes that "The key change in the economy for both the manufacturing and service sectors is a shift from mass production to flexible production" (Berryman, 1988). Citing changes in the textile and banking industries, Berryman concludes that the traditional methods of work are being altered.

"Ever since Henry Ford mobilized the labor of low skilled factory workers through the assembly line to replace teams of skilled workers, technology innovations, at least in the United States, have almost always been synonymous with specialization of labor and mass production. Flexibility has usually been achieved by reversing Ford's process, moving back up the range of skill levels, shifting from specialized to general purpose tools and machines, and reorganizing how people get the work done" Berryman declared.

Both in banking and textiles, workers are more likely to be engaged in a greater variety of activities and thus need to know more than just the particular task they are assigned. Workers are also becoming involved in contributing to ways production techniques can be improved.

The advanced technology, which is increasingly characterizing new machinery, is also having an impact. Historically, machines and production

methods were basically simple. How machines operated could be visually observed and with some additional skills, could be repaired.

That is rapidly changing, Berryman asserts. Today's machines have microprocessors and other electronic components. It is impossible to directly observe how they function. As a result, workers and repair technicians must be able to process information *symbolically* which requires not only higher literacy skills to read complicated manuals and diagrams, but the ability to think and reason differently. As Berryman notes:

> Productivity gains are coming as much from changing the way that workers work together, their orientation towards their work and the nature of their responsibility and involvement in the firm's changing strategy and orientation towards the markets as from applications of new technology. While many jobs used to be based on the repetition of a particular set of well-defined tasks, jobs are now more likely to demand varied and unpredictable responses to a variety of stimuli and information. Employment now involves interaction in constantly changing ways with production technology. The spread of micro-electronics and related technologies does not just result in new machines that must be mastered, but in a much deeper change in the ways that workers relate to the production process and to each other.

Former Secretary of Labor Ray Marshall also maintains that America's ability to compete in a global economy will depend upon basic restructuring of how we produce. The tradi- tional mass production system is obsolete and will have to become less bureaucratic, more decentralized and rely more on advanced technology.

Mass production technology was a standard, stable technology. Information technology is much less standardized and stable which needs constant improvement. It has greatly changed what people need to know and how they work (Marshall, 1987).

Marshall suggests there are three ways to attempt to compete internationally.

First, use standardized technology and unskilled workers – a system under which the United States will lose. Second, try what both General Motors and the Defense Department tried – use higher technology and unskilled workers. They both found out that didn't work. Third, use higher skilled workers and leading edge technology – a system that is most likely to succeed. It will succeed because those workers who use the technology will be able to improve the technology itself and make most effective use of it.

With information technology, work becomes very different than in the mass production system and more of the work becomes indirect because the machines do the direct work. Indirect work also has very different characteristics.

New technology makes more information available and requires the worker to know what to do with it. The use of the new information technology tends to be group work and not individual which is characteristic of mass production work. Group work requires new skills such as the ability to communicate with precision. Working in a team also requires better interpersonal skills and the ability to learn in a different way.

In the mass production system, workers learned by seeing and observing. Information technology learning, on the other hand, is abstract and not directly observable. For example, you can't see what is happening inside a computer.

Marshall argues that creative thinking depends on one's ability to do abstract thinking. By definition, Marshall says, "creativity is what can only be seen in the mind's eye" (Marshall, 1989).

Thus, only by combining leading edge technology with higher order thinking skills will America be able to advance productivity and effectively compete in the international market place.

Shoshana Zuboff, of the Harvard Business School, in her book *In The Age of The Smart Machine: The Future of Work and Power*, underscores the work of Bailey, Berryman and Marshall.

New technology, computers in particular, can transform work in two different ways. It may simply "automate" which will achieve speed and consistency. That will rob workers of whatever skills they have, and any gratification they gain from their work, as well as increase the remoteness and impersonality of management. Or, Zuboff maintains, it may "informate" and empower workers with broad knowledge of production systems and enhance their capability of collaborative and critical judgement about both production and distribution (Zuboff, 1988).

Zuboff examined a variety of settings from high-tech papermaking plants to insurance offices and a pharmaceutical manufacturer and concluded that the nature of work is undergoing a fundamental revolution. Traditional work skills based upon the human senses of touching, feeling, seeing, hearing and smelling of real objects were being replaced by skills that are "abstract, symbolic and ethereal."

UNIONS AND THE CHANGING WORKPLACE

Teamwork, or worker participation, employee involvement or jointness, as it is also known, is also reshaping the American workplace. Frequently the result of new labor-management cooperation, teamwork efforts are more commonplace if not universally embraced by every corporation or union leader. The trend is clearly in the direction of increased worker participation, however.

According to Robert Kuttner, the old industrial relations system that began in the 1930s is one in which unions largely refrained from challenging management prerogatives. The basic goal was to "take wages out of

competition" and provide for relative stability within an industry (Kuttner, 1987).

Today, however, all that has changed since wages are very much part of the competition, not only within industries but especially because of increased competition from both foreign and American firms who are manufacturing abroad using low paid workers.

Some critics, particularly Jane Slaughter and Mike Parker in their book, *Choosing Sides: Unions and the Team Concept*, suggest that worker participation, which they refer to as "management by stress," should be rejected in favor of a traditional trade union role. (Slaughter and Parker, 1988). The mainstream of American labor, however, increasingly endorses the concept and works to implement it in a variety of settings. The Amalgamated Clothing and Textile Workers (ACTWU), the United Steel Workers (USWA) and the United Auto Workers (UAW) are among the leaders.

In their seminal study, *Worker Participation and American Unions: Threat or Opportunity?* Thomas A. Kochan, Harry C. Katz and Nancy R. Mower concluded that there is a strong potential for worker participation especially where actual changes were made in the organization of work and unions served as full joint partners in the process (Kochan, Katz and Mower, 1984).

Perhaps the best known example is the experiment at the New United Motor Manufacturing Inc. (Nummi), the Toyota Motor Corporation – General Motors Corporation joint venture in Fremont, California.

Bruce Lee, director of the UAW western region who was involved in the creation of the Nummi joint venture, called the team system introduced there a "spectacular success...not due to advanced robotics or sub-union wages...(but) a revolutionary team production system run by workers themselves" (Lee, 1988).

The system, according to Lee, "is based on the principle that workers build cars; managers don't." He pointed out that the team system at Nummi is based on shifting control over the production process to the workers on the assembly line who know if the job is being done right.

At Nummi, workers are given new responsibilities. Teams of workers handle a series of related assembly operations and are encouraged to develop ways to improve the system. Lee maintains that the UAW has been telling auto industry management for years that their members take pride in their workmanship. "We have said workers will cooperate enthusiastically in finding ways to do a job better if managers are smart enough to tap into their pride and expertise," he said.

At their recent convention in Anaheim, UAW President Owen Bieber delcared: "I think those who say that workers don't want change in the workplace – who insist that the old ways were always the best ways – are insulting the intelligience of UAW members" (*UAW Washington Report*, 1989).

Workers are "stakeholders" in their corporations and want them to be successful. Unions have the long term interest of workers in mind and want them to have the skills needed to work productively. They are not focused on maximizing short-term profits.

Cooperative labor-management strategies will fail if the goal of management is to create docile workers and weak unions or a "union-free environment." There must be genuine sharing of responsibility and authority and a prospect for mutual gain if it is to succeed.

According to Kochan, Katz and Mower, employers must accept the legitimacy of the union if they expect labor's support to be viable. Union representation is the vehicle through which employees can secure and define their right to participation. Employers may choose to give non-union workers a greater voice but only legal union representation provides equal representation and independent power (Kochan, Katz, Mower, 1984).

In non-union settings, the employers decide what the rules are going to be and can unilaterally decide to alter the arrangements at any time, particularly if new management takes over. Unions are accountable to the members who created them and are more likely to have the resources to allow them to participate effectively. If Americans want more teamwork and true labor-management cooperation to help make the U. S. economy competitive, the relentless anti-union crusade among many employers must end.

In a cover story entitled "Go Team! The Payoff from Worker Participation," *BusinessWeek* praised a number of recent efforts to incorporate worker participation or employee involvement(EI) (July 10, 1989).

BusinessWeek states that worker participation in the United States has evolved from some small scale efforts in the 1920s and 1930s at "problem-solving teams," to "special-purpose teams" in the 1980s to "self-managing teams" which they argue "appear to be the wave of the future."

Under "self-managing teams," usually from 5-15 in number, employees produce an entire product instead of various sub-units. Under the system, team members learn all tasks and rotate from job to job and take over certain managerial duties. It fundamentally changes how work is organized and gives employees greater control over their jobs.

The employee involvement movement "has unleashed enormous energy and creativity stored up in (workers) who like the idea of using their brains, as well as their bodies, on the job. It increases their feelings of dignity and self-worth," *BusinessWeek* notes (July 10, 1989).

In fact, if America is to be a world-class manufacturing country, they argue, companies will have to be able to produce in small lots and customize their products. Teamwork provides the flexible work practices the enable firms to respond to these demands. One manager quoted in that same article said that when "you combine automation with new systems and work teams, you get a 40 percent to 50 percent improvement in productivity."

The *BusinessWeek* article also quotes Harvard University theorist Richard E. Walton who said, "To have world-class quality and the ability to assimilate new technology, we must have the world's best ability to develop human capabilities."

THE BUSINESS CONCERN

While America faces dramatic new challenges as a result of a changing global economy, and attempts to respond by restructuring the means by which it produces goods and services, the question that comes to the forefront is "Do we have the human resources available now or in the future to win the battle?" The alarming conclusion of most economists, government and corporate leaders, and educators is a resounding "No!" As a result, labor force policy is replacing traditional economic topics as the central economic issue around the world. Human resource development is being more and more recognized as the key to economic survival. Because of demographic trends and an inadequate system of education and training, there is a growing mismatch between skills and jobs, and unless something is done, the United States will quickly fade as a world economic power.

A *BusinessWeek* "Special Report" examined the growing mismatch between jobs and the ability of Americans to do them. Citing work done by the U. S. Department of Labor and the Hudson Institute, *BusinessWeek* found that more than three-quarters of new workers will have limited verbal and writing skills (the lowest level on a sliding scale measuring levels of reading, writing and vocabulary needed to perform a wide range of jobs) but will be competing for only 40 percent of the new jobs. Fewer than one in four new employees will have the needed skills to perform at the higher end of the scale where the majority of jobs will be (*BusinessWeek*, September 19, 1988).

Many leading American corporate officers have begun to focus on human resource development and are urging others to do so as well. Owen B. Butler, retired chairman of Proctor and Gamble; David Kearns, Chairman and Chief Executive Officer of Xerox; Kay Whitmore of Eastman Kodak Company; and John Creedon, president and chief executive officer of Metropolitan Life are but a few. In addition, numerous business organizations are entering the human resource arena led by the Committee for Economic Development.

A number of conferences have been held, reports and books have been published, and CEOs have both spoken out and taken concrete action to meet the problem head on. The Committee for Economic Development has been in the forefront by disseminating some thoughtful and thorough studies on what America needs to do to stay competitive. In large part, the various reports focus on demographic trends and strategies for enchancing human resource development.

Charles Marshall of the American Telephone and Telegraph Company told a Congressional panel, "We are not interested in education simply for altruistic reasons; we need knowledgeable, well-educated, highly skilled employees if our business is to succeed"(quoted in Jennings, 1987).

DEMOGRAPHIC TRENDS

A number of studies have been completed on what the future of the American workforce is likely to look like and what the implications are for our economy.

A U. S. Department of Labor commissioned study by Hudson Institute entitled "Workforce 2000" estimates that 25 million entrants to the labor force will be needed by the year 2000. Most of these will be nonwhite, female or immigrant workers. Native white males, who now constitute 47 percent of the labor force will account for only 15 percent of the new entrants into the labor force by the year 2000 (Johnston, 1987).

The American workforce is also growing older. In the 1990s, the labor force will be dominated by "middle-aged" workers aged 25-54.

The number of young Americans is shrinking dramatically. Between 1980 and 1996, our youth population (15-24) is expected to drop by 21 percent or from 43 to 34 million. Young people as a percentage of the nation's population will also drop from 18.8 percent to 13 percent during the same period. In addition, the composition of the new entrants is changing rapidly to include a higher percentage of minorities who have historically not been well served by society.

Also, according to *The Forgotten Half: Non-College Youth In America*, published by the W. T. Grant Foundation, approximately four million young people between 15 and 24 years of age are challenged by some sort of impairment, either a permanent physical or psychological condition that limits their activities(W. T. Grant Foundation, 1988).

According to a study entitled *All One System* by Harold L. Hodgkinson, published by the Institute for Educational Leadership, "Changes in the composition of the group moving through the educational system will change the system faster than anything else except nuclear war...By knowing the nature of those coming into first grade in the U. S., one can forecast with some precision what the cohort of graduating seniors will be like 12 years later" (Hodgkinson, 1985).

According to the report, the birth rate of whites and Cubans is below the stay-even point, while that of blacks and Mexican-Americans is well-above. Thus, the latter two groups will be a larger part of the future population. "All these young people have to do is grow older and we have the future," Hodgkinson declares.

Hodgkinson notes that "In 1955, 60 percent of the households in the U. S. consisted of a working father, a housewife mother and two or more school-aged children. In 1980, that family unit was only 11percent of our homes and in 1985 it is 7 percent, 'an astonishing change'."

A key point that Hodgkinson and other demographers frequently emphasize is that 20 percent of the students currently in public elementary and secondary schools are economically disadvantaged. By the year 2000, one-third

of all students will be economically disadvantaged and these students do less well in school. In addition, Hodgkinson points out that the "normal" childhood experience is becoming a thing of the past with increasing numbers of children being born out of wedlock, being born to parents who divorce before the child is 18 or to parents who separate. In fact, he asserts, only 41 of 100 will reach 18 "normally."

One major impact on the schools and the workforce of the future will be the huge increase in children born out of wedlock, half of them born to teenage mothers. Indeed, Hodgkinson asserts, every day 40 teenage girls give birth to their third child. "To be the third child of a child is to be very much 'at risk' in terms of one's future," he states. An important aspect of this trend is that teenage mothers tend to give birth to children who are premature because of poor diet and lack of physical exams. This leads to low birth weight which is a good predictor of major learning difficulties when a child gets to school. The effect is that about 700,000 babies of the annual cohort of around 3.3 million births are almost assured of being either educationally retarded or "difficult to teach."

The W. T. Grant study points out that growing up in poverty will have a dramatic impact on a young person's chance of having weak basic skills. The report notes that "Nearly half of all poor youth score in the bottom fifth of the basic skills distribution, while over three-fourths of all poor youth have below average basic skills." The combination of poverty and weak basic skills, and not ethnicity or race, correlates highly with disparities in teen childbearing rates.

TRADITIONAL AMERICAN EDUCATION

The American education system has historically served our nation well. At the founding of our republic, Thomas Jefferson said that a more general diffusion of knowledge was necessary to create "an aristocracy of virtue and talent" that would help to ensure the great American experiment with democracy and liberate the energies and imagination from within the "common man." For our nation's first century, our economy was basically rural and formal education was limited. In the 1820s, the American labor movement intensified its efforts to establish a free, universal, public education system "that shall unite under the same roof the children of the poor man and the rich, the widow's charge and the orphan, where the road to distinctions shall be superior industry, virtue and acquirement without reference to descent" (*Labor: Champion of Public Education*, 1986).

Following the Industrial Revolution, our elementary and secondary education system reflected the needs of an economy based on mass production. The system was modeled on the factories, where many of the students would one day work, and placed emphasis on following instructions, discipline and routine tasks – all hallmarks of factory work. Unfortunately, the system has not changed much since. It is larger, more children attend and graduate, but the typical pattern of "chalk and talk" with one teacher lecturing to 25 students five times a day remains true in most schools.

By some measures, our schools have been very successful. Over three-quarters of the adult population has a high school diploma and the figure is 87.5 percent for younger adults. Nearly two-thirds of all high school graduates begin post-secondary education and 17.4 percent of American adults have a college degree, which is twice the number in 1960. One in four younger Americans are now receiving college degrees.

In 1940, only about 25 percent of Americans earned a high school diploma. In 1953, a majority of high school students graduated, 66 percent in 1980 and 75 percent today. Despite the nation's preoccupation with the drop-out rate, one of American education's great successes has been its ability to retain a larger number of students through high school and onto postsecondary education. A generation ago and before, however, young people who left school after the eighth or ninth grade were likely to find a job in a mass production industry such as auto or steel. Since the work was unskilled or low-skilled, these workers were able to be successful and productive workers and, in large part due to unions, were able to earn a middle class living, buy a home and send their children to college.

All of that, of course, has changed. It is not that our schools are less competent than they once were, but that work is more complex than it ever was, and so there is a growing mismatch between jobs and skills. Declining numbers in our workforce mean that our economy and our standard of living will not be maintained unless we are successful with more students.

Recent studies of the National Assessment of Educational Progress (NAEP) including *The Reading Report Card* and *Crossroads In Education* report some interesting findings. The positive news is that virtually everyone has mastered the "basics." Students can read simple material and add, subtract, multiple and divide whole numbers. Also, while an unacceptable gap still remains, blacks and Hispanics have been successful in narrowing the distance between their scores and those of white students in reading and math.

The problem is that beyond these minimum basics, large percentages of students do not perform very well. Only about 6 percent of 17 year olds can solve a multi-step math problem and only 7 percent are able to infer relationships and draw conclusions from detailed scientific knowledge. Only 20 percent can write an "adequate" letter applying for a job at a local swimming pool demonstrating a little critical thinking and persuasive ability. And only 20 percent of a total sample of 3,600 individuals between the ages of 21 and 25 could correctly answer a question that involved reading a bus schedule.

A study recently concluded by the Educational Testing Service, *A World of Difference*, compares the math and science performance of 13-year-old students from the U. S. and 11 other countries and Canadian provinces. The American students perform at the very bottom (LaPointe, Mead, Philips, 1989).

Paralleling NAEP findings, U. S. students did very well at the easiest and lowest levels in math, e.g. 97 percent of U. S. students are able to add and subtract with others scoring 98, 99 or 100 percent.

The results were essentially the same in science. Almost all students in all countries knew simple everyday facts but applying simple scientific principles once again found the U. S. near the bottom. At the highest level tested – applying scientific principles – 33 percent of the Koreans showed proficiency while only 12 percent in the U. S. did and only three countries scored lower.

One reason for the poor performance of U. S. students has been the lowering of high school diploma and college entry standards, which have recently begun to turn around.

Ironically, 23 percent of the Korean students tested said they thought they were good in math while 68 percent of the American students answered yes to the same questions.

The conclusion is that American students have mastered the basics but they are no longer sufficient. Increased competition from foreign workers, many of whom are better educated, and the increasing complexity of the workplace, are leaving those without advanced skills out in the cold. While most Americans realize there is a problem with the nation's educational system, most believe their local schools are good and that their children are doing well. The Gallup poll reports that Americans give higher marks to the schools their children attend than they do schools-in-general. And by the most frequently used measurements, parents have reason to believe that their own children are doing well. States and local school districts contribute to the sense that all is well by citing standardized test results. All of their own students are "above average," as John J. Cannell demonstrated. Japanese mothers give their children's schools much lower approval ratings. It is also generally believed that Japanese parents believe that school success is the result of *effort* while American parents attribute success largely to *ability*. That basic difference has profound implications on how hard U. S. students work and what is expected of them by both parents and schools.

What Americans and parents expect of their schools and students is an important part of any effort to make the education system meet the demands of the workplace of tommorow.

SKILLS FOR TOMORROW

Public education in a democratic society should prepare students to be productive and contributing members of the nation's economic life but also to be responsible citizens who can make informed decisions on issues affecting their personal lives and those affecting public policy. Increasingly, those skills have more in common than not.

As Sue Berryman has pointed out, the transformation of work currently underway is requiring not necessarily "more" or "less" skill but new and different skills. "Employment now involves interaction in constantly changing ways with production technology. The spread of micro-electronics and related technologies does not just result in new machines that must be mastered but in a

much deeper change in the way production is organized and the ways workers relate to the production process and to each other," Berryman asserts (Berryman 1988). She says there is still a need for good basic skills but there is now also the need for higher order thinking. She argues that there is also "a stunning parallel between changes in the structure of work and the defining characteristics of higher order thinking," and that it is important to include thinking, problem-solving and reasoning skills for all students and not just those destined for college. She suggests that making thinking and problem solving a regular part of the curriculum for everyone and cites the work of cognitive psychologist Lauren Resnick of the University of Pittsburgh for a description of higher order thinking as well as the work of CUNY Professor Dr. Sylvia Scribner who explores the relationship between school-based and non-school-based learning.

Scribner's work, notes Berryman, challenges implicitly the traditional distinctions between "head" and "hand," between "academic" and "vocational" and between school-based and work-based learning.

In summary, Resnick concludes that, in school, a student's success or failure is essentially independent of what other students do (except for grading on a curve) while activity in the "real world," depends a great deal on working interdependently with others. School-based-learning is also based a great deal on "pure thought" as opposed to reliance on calculators and other "tools" often found in life and work settings. In addition, school learning is most often "symbol-based" but with little connection from any meaningful or wordly content. Finally, the kind of "generalized" learning in schools is rarely linked to the "situation-specific competencies" required in out-of-school environments, Resnick notes.

These findings have major implications for how schools should teach according to Berryman. In sum, she argues for more team and co-operative learning with the student being held accountable for their individual as well as team performance; situations where students are taught *how* to get the right answer and not just *having* the right answer (and situations where teachers, as well as students, do not know the answers); and "contextualized learning" where instruction would more closely mirror real life, for example, more apprenticeship-like and simulated experiences.

In a speech delivered the the business community in Kansas City last year, SUNY at Delhi professor Vincent Ryan Ruggiero echoed the findings of Berryman, Resnick and Scribner. "Business and the professions don't need walking encyclopedias—they need problem solvers and decision makers. And the only way they will get them is if thinking instruction is made the central objective at all levels of education," Ruggiero told the group. Schools need to replace "mindstuffing" with "mindbuilding" he argued (Ruggiero 1988).

Ruggiero also noted that intellectual skills are really no different from physical skills and that there is a difference in telling students *what* to think as opposed to teaching them *how* to think. He criticized schools for assuming that thinking skills are automatically learned as a byproduct of amassing facts.

A number of studies have been completed recently that outline the knowledge, skills and attitudes those entering postsecondary education or the world of work need. *Academic Preparation for College: What Students Need To Know And Be Able To Do* by the College Board is a fairly comprehensive outline of the basic academic competencies and academic subjects required of college entrants. A more recent publication, *Workplace Basics: The Skills Employers Want* summarizes a two-year research project of the American Society for Training and Development and the U. S. Department of Labor (Carnevale, Gainer, Meltzer, n.d.).

Workplace Basics reinforces the findings that there is a trend in the "upskilling" of work in the United States that is being driven by technical changes, innovation and competition. Companies are requiring adaptive and innovative workers with strong interpersonal skills. New business strategies such as collaboration, emphasis on quality, and exemplary customer service are demanding better listening and problem-solving skills and of attention to teamwork, creativity and the ability to set goals.

The *Workplace Basics* prescription for a well-rounded worker includes the basic skills associated with formal schooling but, in addition:

> Employers want employees who can learn the particular skills of an available job – who have "learned how to learn."
>
> Employers want employees who will hear the key points that make up a customer's concerns (listening) and who can convey an adequate response (oral communications).
>
> Employers want employees who can think on their feet (problem-solving) and who can come up with innovative solutions when needed (creative thinking).
>
> Employers want employees who have pride in themselves and their potential to be successful (self-esteem); who know how to get things done (goal setting motivation); and who have some sense of the skills needed to perform well in the workplace (personal and career development);
>
> Employers want employees who can get along with customers, suppliers or co-workers (interpersonal and negotiations skills); who can work with others to achieve a goal (teamwork); who have some sense of where the organization is headed and what they must do to make a contribution (organizational effectiveness); and who can assume responsibility and motivate co-workers when necessary (leadership).

RESTRUCTURING SCHOOLS

The American education system offers the best hope to improve American productivity as has been the case for at least sixty years. As Anthony Patrick Carnevale noted:

> People, not machines, are the well-spring of productivity. Since 1929, growth in on-the-job know-how, the reallocation of labor through retraining, and increased labor quality through education, training, and health care consistently have accounted for more than three-quarters of productivity improvements and most of our growth in national income. By comparison, over the same period, machine capital has contributed a consistent and disappointing 20 percent or less (Carnevale, 1983).

The convergence of an increasingly competitive global economy, transformations in the nature of work and the workplace and the skills they demand, and disturbing demographics trends call for a redefinition of the purpose of schooling and the way schools are organized. A fundamental restructuring of American public education is not only desirable, it is imperative if the United States is to remain a nation of economic, social and political vitality.

American Federation of Teachers president Albert Shanker frequently draws the analogy between education in the 1980s and the auto industry in the 1960s and 1970s. Until fairly recently, the American auto industry had little to worry about. The cars produced in the 25 years following World War II were considered the best in the world and U. S. automakers faced little competition. In the 1970s, Japanese automakers began to penetrate the American market with high quality, low cost cars and earned a steady increase in its share of the American market. The American automakers responded by denying that any problem existed and turned to Madison Avenue to solve the problem. Meanwhile, the Japanese, who were joined by the Koreans and West Europeans, continued to produce cars of higher quality at a price American consumers were willing to pay. The result was the near bankruptcy of Chrysler and serious problems for both Ford and General Motors. Only recently have U. S. automakers responded by attempting to revitalize the industry by adopting strategies employed by its foreign competitors. Today the GM, Chrysler and Ford cars are much better than those produced in the 1960s and 1970s. Unfortunately, that's not good enough. People don't buy cars because they are better than the ones we used to make. They buy the best car for the money (Shanker, *The College Board Review*, 1988).

The same lesson applies to American education, Shanker argues. A generation ago, our schools were meeting the demands of our economy. Even though there was a 75 percent drop-out rate in 1940 and 50 percent drop-out rate in 1950, the labor market was able to absorb those drop-outs and those who went on to school were sufficient to meet the skilled needs of industry. As a result, public schools enjoyed wide approval.

Now, everyone is alarmed by a 25 percent drop-out rate – and should be. The reason is that there are new demands on the labor force that were not there 20 or 30 years ago. As former Maryland Superintendent of Schools David Hornbeck remarked, "It used to be the case that the victim of our failure with youngsters was only the younster. Today, because we need all the kids, we all become the victims. The demographics no longer permit throw away or disposable children."

The problem, then, is not that the schools are worse or are doing a poorer job – the evidence is to the contrary – but that much more is demanded of them if our workforce is to be "world-class."

Just as GM has launched the Saturn project and hundreds of American corporations have restructered the way they produce, so too, does the American education system need restructuring. Xerox's David Kearns said that in restructuring his company, he realized that incremental changes were no substitute for structural reforms. "At Xerox, we realized we couldn't beat our Japanese competitors just by tinkering with our production methods...So we revolutionized the way we do things...We restructured everything – the way we manufacture, the way we design, the way we think." Kearns then concluded, "That's what our public schools have to do, too..." (Kearns, 1986).

Perhaps the leading charge for educational restructuring comes from AFT's Al Shanker. He says that the present system is based on the factory model. It is based largely on teacher talk which fails to reach the overwhelming number of students. Schools currently view the teacher as the worker and the student as the product – as passive receivers of knowledge, he argues.

There is a better way, he states, and that is essentially to view students as workers and teachers as managers. The "work environment" is not the factory floor of the past but the complex workplace of the future where students and teachers both are actively engaged in the learning process (Shanker, College Entrance Examination Board, 1989).

What would such a school look like? While the first wave of the education reform movement raised academic standards and focused on developing a quality teaching corps, the second wave is zeroing in on ways to "restructure." A number of experiments are underway in Rochester, Miami, Toledo, Cincinnati, Pittsburgh, New York City and dozens of other districts (David, 1989).

An excellent example of a restructured school is found in Cologne, West Germany. The Köln-Holweide school is a "comprehensive" school that grew out of a German education reform movement that began in 1963 with the publication of *German Educational Disaster* which focused attention on an outmoded, class-based school system. The report concluded that the German school system was not producing enough qualified students to fill jobs in modern industry, technology and science (*American Educator*, Spring 1988).

The 2000 – student school has a pupil population composed of a fairly equal mix of high, middle and low ability students including 35 percent who are foreign born, mostly Turks.

By virtually any measure, the school is succeeding. Only one percent of the students drop-out compared to the West German average of 14 percent. Sixty percent of its students score well enough to be admitted to a four-year college compared to a national average of 27 percent. In addition, there is practically no truancy, very little teacher absenteeism and only minor discipline problems.

According to headmistress Anne Ratzki, the Köln-Holweide school differs from most American schools in five ways. First, teachers work as part of a team of six to eight teachers that is responsible for the education of the three groups of twenty-seven to thirty students.

Second, teachers are responsible for the total education of the students making sure they are a success personally as well as academically.

Third, the teacher teams and students remain together for six years – from fifth grade until they earn their "leaving certificate" at the end of tenth grade.

Fourth, the teacher teams are empowered to make all the decisions regarding teaching, scheduling, inservice training, mentoring of new teachers and other responsibilities.

Finally, Köln-Holweide students do not compete against each other in traditional ways. In their groups, children are encouraged to cooperate and work with one another. They encourage one another, and in some instances, tutor teammates.

Classrooms look very different from traditional classrooms of five rows of five or six students facing a lecturing teacher. Students are engaged in solving problems, writing, talking with one another or preparing for a class presentation among other active endeavors. Teachers are more managers of a learning environment than dispensers of information.

Forty percent of the Köln-Holweide students, as opposed to 25 percent of all students, also pass the German national exam known as the *abitur*. Unlike standardized tests in the U. S. that rely on multiple choice questions, the *abitur* is a six hour written examination in two subjects, a three hour exam in one subject and one thirty minute oral examination. The test is developed by the teacher and approved by government authorities and must cover the curriculum.

There are approximately twenty similar schools in Germany today that incorporate many of the approaches of Köln-Holweide school. Since the number of applicants now far exceed the available spots at Köln-Holweide, that number is likely to grow.

Similar experiments are underway in the United States. For example, in the Twin Cities, the Chiron Middle School in Minneapolis and the Saturn School of Tomorrow in St. Paul are restructering (Pearlman, 1989).

The Chiron Middle School, named after a newly discovered star in the universe, opened in September 1989. The school's 300 students will attend nine-week sessions at a series of learning centers in the community including government, manufacturing, communications, environmental, health, retailing,

zoological, and information processing among others. Students will be involved in a variety of activities and projects. Students will work in teams and interact with community resources and make presentations, not only to fellow students, but to parents and the community as well.

St. Paul's Saturn School of Tomorrow, which grew out of a suggestion by AFT president Al Shanker, is named after GM's Saturn project. It opened in September 1989, with 150 students in grades 4-6 and additional grades will be added in subsequent years. The goal of Saturn is the "reformation and redesigning of the schooling process." The Saturn curriculum will consist of the district curriculum plus "the skills and knowledge necessary to succeed in the 21st century: world languages, global education, technologies, ethics, careers, mentorships."

Saturn students will work cooperatively in teams and will develop a personal portfolio of their work and projects. Teachers will also work in teams and be empowered to determine schedules and learning activities.

In addition to the St. Paul Public Schools and the St. Paul Federation of Teachers, other partners in the Saturn school include Apple Computer, Control Data, Pioneer Communications and a local college education department.

School restructuring is not limited to elementary and secondary education. The McMaster University Medical School in Hamilton, Ontario, has replaced its traditional lecture format with problem solving teams. The results to date indicate that students have improved not only their knowledge base but have improved skills needed to practice medicine as well.

The American Federation of Teachers has taken the lead nationally to promote school restructuring. Its Education Research and Dissemination Project links the latest research to classroom teachers. The 1989 AFT QuEST Conference was devoted entirely to restructuring and the AFT sponsored a Restructuring Academy on the campus of Michigan State University this summer. In addition, a large number of AFT affiliates are actively engaged in a wide variety of programs to redesign and restructure schools in addition to Minneapolis and St. Paul.

A NEW FOCUS ON THINKING SKILLS

Common to restructured schools is the effort not only to promote the mastery of a body of knowledge but the enhancement of thinking and reasoning skills as well. Indeed, an entire movement seems to have grown up in recent years around the theme "critical thinking." If workers are to be prepared for the future of work, the trend needs to be accelerated.

Jack R. Fraenkel, in his book *Helping Students Think and Value: Strategies For Teaching Social Studies* attacks a number of unwarranted assumptions about teaching thinking. Fraenkel makes the following observations:

Thinking skills can be taught.

Thinking involves an active transaction between an individual and the data with which he is working. Data (information) becomes meaningful only when an individual performs certain cognitive operations upon it. Thus students must be involved and actively working with data if thinking is to be encouraged.

The ability to think cannot be "given" by teachers to students. How well an individual thinks depends on the richness and significance of the content with which he works, his own interests and desire to participate in the endeavor, the processes he uses, and the initial assistance he is given in the development of such processes.

All subjects offer an appropriate context for thinking.

All children are capable of thinking, though the quality of individual thinking differs markedly.

Since thinking takes many forms, the specific thinking processes which are being developed should be clearly differentiated in the teacher's mind.

Precise teaching strategies can be developed which will encourage and improve students thinking (Fraenkel, 1980).

Fraenkel states that there are essentially four forms of thinking: convergent, divergent, critical and creative. Convergent thinking occurs when one organizes ideas so that they *converge* or point toward one logically correct answer. It is basically logical thinking or deductive reasoning of which the syllogism is probably the best example.

Divergent thinking is when there is no one right answer. One tries to come up with as many different answers, ideas, alternatives and conclusions as possible. One example is inductive reasoning which is frequently called the scientific method.

Critical thinking is the attempt to make an intelligent judgement to decide which among alternatives is better. It is the basis of evaluation and requires criteria of some sort.

Creative thinking is the attempt to create a new or novel idea and is not bound by logic. It has no set of rules or procedures and is actually a form of divergent thinking.

Fraenkel discusses eleven different "operations" he argues can be effectively taught. They include observing, describing, comparing and contrasting, developing concepts, differentiating, defining, generalizing, predicting, explaining, hypothesizing and offering alternatives. He offers a number of strategies for teaching these "thinking skills."

Thinking and reasoning skills cannot be taught, nor should they be, in a knowledge content vacuum. The mastery of a body of knowledge is not of greater or less importance but of equal importance. The mastery of content and the development of thinking and reasoning skill should be interdependent and taught simultaneously.

If students are to have the needed skills for tomorrow's workplace, the development of thinking and reasoning skills should become the "core curriculum" in grades K-12 and in every secondary subject. Restructuring schools should develop a comprehensive and systematic method for introducing and reinforcing thinking and reasoning skills throughout the curriculum.

TEAMWORK

Another key ingredient of the workplace of the future is the ability to work as a member of a team. Restructured schools are placing important emphasis on collaborative or cooperative learning. Learning to be an effective member of a group or team can be taught. A large number of teachers and schools already are employing cooperative learning strategies with a great deal of success. Working in a group supports the concept of the "student as worker" and is an excellent method for teaching the thinking and reasoning skills outlined by Fraenkel and others. It is a natural marriage.

Workplace Basics includes "Group Effectiveness" as one of its major recommendations for skills employers want. "Whenever people work together, successful interaction depends upon effective interpersonal skills, focused negotiations, and a sense of group purpose," the report says. It adds that training in group effectiveness also "includes techniques for separating people from the problem, focusing on interests not positions, inventing options for mutual gain and insisting on the use of objective criteria" (Carnevale, Gainer, Meltzer, n.d.). Team members should also have an understanding of group dynamics such as understanding consensus decision-making techniques, brainstorming, leadership functions and so on.

As is the case with thinking and reasoning skills, collaborative learning is not devoid of content mastery but one effective means to help master knowledge while developing a host of skills.

Restructuring schools around the concept of students as workers advanced by Shanker will incorporate these strategies. As Shanker points out, the idea of students as workers "is central to the improvement of education and schooling. Basically, all education is self-education. In order to learn, a student must *work* at it by listening, reading, writing, drawing, speaking, questioning, imagining, building, etc. We learn by doing, not merely through passive presence in a classroom, sitting in front of a teacher. Students must be actively engaged in their work" (Shanker, November 20, 1988).

THE AT-RISK: A SPECIAL EMPHASIS

Because of the labor shortage and demographic trends, special attention must be given to the category commonly referred to as the "at-risk" students. These are students who do not perform well and are "at-risk" of dropping out and not having the necessary skills to become a productive worker or member of society. While at-risk students come disproportionately from poor families, the category can and does include others.

The good news is that for the first time in recent history, the needs of the disadvantaged and the needs of the American workplace are merging. The efforts to increase productivity and competitiveness is changing the debate over social equality into one about economic growth (*BusinessWeek*, September 19, 1988).

A large number of studies and reports have focused on this population and numerous recommendations have been advanced including improved efforts at prenatal care, early childhood education, enhanced Headstart funding and special efforts by communities and schools to help at-risk children succeed.

The restructured school can go a long way to create an environment where these youngsters can enhance their self-esteem and learn. The Köln-Holweide experience is illustrative.

THE SCHOOL-TO-WORK TRANSITION

Business can also play an important role in improving the chances of at-risk students. If students sense that their work will pay off and can see themselves in a job, they are more likely to try harder in school. As *The Forgotten Half* states, "When [students] observe a direct relationship between what they do in school, their work experience, and accessible future careers, they are more willing to make present sacrifices in hopes of future gains"(W. T. Grant Foundation, 1988).

The Forgotten Half points out that many youngsters, irrespective of how well they do in school, are seldom hired out of high school by employers. Employers typically wait until young people reach the age of 20-22, or later, before hiring them, leaving recent graduates who are not college bound, to "alternate low paid work and unemployment with a growing frustration that erodes their confidence." The report suggests that employers seek out recent graduates so they can begin meaningful work sooner and also to offer hope to those currently enrolled.

Some very interesting research on school-to-work transition has been completed by Cornell professor John H. Bishop. Bishop contends that while evidence shows that there are benefits to staying in school, "most students do not benefit very much from working hard in school" (Bishop, 1987). The problem, Bishop asserts, is a lack of incentives. He argues that the labor market fails to reward effort and achievement in high school since employers do not pay attention to high school records beyond the granting of a diploma. If employers

are competing for better workers, why don't they reward those who have achieved more in school? Why don't young workers who have achieved well in school receive higher wages? Japan, Germany and other nations demand a lot of students and have systems in place that reward school success. Admittance to the German apprenticeship system is a prime example.

Bishop also calls for a radical restructuring of schools and proposes a series of recommendations including better measures for academic measurement, cooperative learning, mastery learning, increased opportunities for outside of school learning and a better system for linking employment opportunities to school performances. The last recommendation is particularly important for at-risk youngsters.

Similar conclusions have been reached by James E. Rosenbaum of Northwestern University and Takehiko Kariya of the Japanese National Institute of Multimedia Education. Writing in the *American Journal of Sociology* they describe how the Japanese link success in school with employment. That system, they conclude, provides strong incentives for high school achievement (Rosenbaum and Kariya, 1989).

APPRENTICESHIP – A MODEL THAT WORKS

The most successful model for preparing a highly trained and competent workforce has been developed primarily in the building and construction industry – the joint apprenticeship program. Registered apprenticeship programs are responsive to the demands of the workplace because the standards for training are jointly set by employers and unions both of whom have a vested interest in a highly qualified workforce.

Quality apprenticeship programs combine strong academic education, skills development and on-the-job training. Curriculum is constantly updated to meet the demands of new technology. Apprenticeship programs are also designed to match the employment needs of the industry by limiting entrants for available jobs when the economy is slow and increasing the number as the economy expands.

Vocational education in secondary schools should support, and not undermine or compete with, apprenticeship programs. Educating students to directly enter industries that have existing apprenticeship programs undermines those programs and compromises the standards of the industry by providing workers whose skills do not measure up to those who successfully earn their journeyman card. They also can play havoc with the labor market by producing workers for industries where there are no jobs or are already trained apprentices and journeyman available.

The apprenticeship system should be expanded into the manufacturing, public, and service sectors. Some corporations have successfully emulated the apprenticeship system of the building and construction industries with great success by maintaining the same high standards typical of registered programs. Any new programs should be required to meet these traditional high standards

and those that are designed to circumvent or compromise these standards should be rejected.

Schools have much to learn from the apprenticeship model which is particularly relevant given the needs the changing workplace in the manufacturing and service sectors.

THE ROLE OF VOCATIONAL EDUCATION

The first phase of the education reform movement treated vocational education with either hostility or neglect and focused on raising "academic standards." While the attention to academic standards was important, reformers missed important lessons from vocational education for restructuring schools and improving the school-to-work transition.

According to *The Unfinished Agenda: The Role of Vocational Education in the High School*,"...instruction in vocational classrooms offers an alternative – an avenue for breaking away from the all-too-similar characteristics of so many classrooms" (The National Commission on Secondary Vocational Education, n.d.). The report argued that the teaching-learning process characteristic of quality vocational education programs is able to respond to diverse learning styles.

The study notes that vocational programs teach problem solving and analytical skills and reinforces basic communications and interpersonal skills through applied and small-group learning activities. Vocational education teaches the ability to gather and analyze information, reasoning, applications of technology and an understanding of the American economic system.

In quality vocational courses, instruction is "individualized and cooperative and often emphasizes student mastery of specific skills or competencies," the study notes. In addition, students frequently work in teams and often on group projects. Vocational education also more closely reflects real life and provides opportunities for real life or simulated workplace experiences.

Ironically, then, vocational education, long viewed as an educational step-child, provides an excellent model for restructuring the academic learning environment.

There needs to be better articulation between academic and vocational education and between secondary and postsecondary vocational education as well as improved linkages between vocational education and the world of work, but educators involved in school restructuring will find that vocational education, in addition to meeting labor market needs, has a lot to offer as a process as well.

TOWARD A NEW AMERICAN WORKER

A recent survey by Louis Harris and Associates for the Carnegie Forum on Education and the Economy entitled *Redesigning America's Schools: The Public*

Speaks, concluded "It is clear...that the American people and business leaders are both convinced that the way for this country to become competitive with foreign business, especially the Japanese, is not to try to revert back in time and try to compete with unskilled and low skilled labor. But Instead, they believe, the U. S. should face up to exporting or automating such lower skill jobs and production activities and turn to creating whole new opportunities on a base of a labor pool that is far more sophisticated and far better trained to perform those highly skilled tasks that would once again make the U. S. competitve in the world"(Harris, 1986). Harris reported that large majorities are convinced that a whole new approach to educating and training the American workforce must be undertaken. New skills are required of everyone and they must be targeted in the public schools to all students. And Americans are willing to pay according to Harris. He reportedthat "77 percent of the public is willing to pay a tax increase to improve the quality of education, as are 65 percent of the top business leaders willing to pay higher corporate taxes to make the quality of education better."

American public education has historically responded to meet the needs of a changing American economy and society. In response to the Industrial Revolution, the United States developed an educational system that prepared workers to function in mass production and emulated the factory system. Simultaneously, it produced a sufficient number of trained people for the professions, management and technical positions such as engineering.

Tomorrow, the challenge will be very different. The very nature of work and the workplace are dramatically changing requiring new sets of skills. The schools of tomorrow must prepare all students to be successful in the new work environment.

The "New American Worker" is really two people. The first is a worker who has the knowledge, skills and attitudes to successfully function as a member of a team and who interacts with everchanging technology in a decentralized and flexible *production* environment. The second is the student who functions as a member of a team and who interacts with everchanging technology in a decentralized and flexible *learning* environment. The characteristics of the new American worker and the new American student are merging into one and the same.

That is the lesson American corporations are quickly learning and restructuring to accommodate. The question remains as to whether the nation's public schools will learn the same lesson and restructure to meet the challenge.

The economic imperative is obvious. However, much more is at stake. The future of a nation and its people depend on how we respond. A new American worker can keep the American Dream alive.

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